Arctic Urban Risks and Adaptations (AURA): a co-production framework for addressing multiple changing environmental hazards

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Wildfire

Rain-in-winter events

Permafrost thaw

Alaska Fire Science Consortium Meeting
Spring 2020
Team

Robert (Zeke) Ziel
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Dmitry Nicolsky
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Economists

Sustainable Earth
(Birgit Hagedorn)

Monika Calef and Anna Varvak

Peter Bieniek
Rick Thoman

Partners
Communities
Cold Climate Research Center
Scenarios Network for Alaska and Arctic Planning
Study Areas

4-year project
Goals

- To better understand how thawing permafrost, wildfire, and rain-in-winter hazards are changing
- Understand and assess the risks and costs associated with the hazards
- Develop and evaluate measures that could enhance the capacity of local residents and governments to respond effectively as climate continues to change
- Work together to identify other areas of overlap to facilitate synergistic activities between academia and communities
The process

Objective 1 Assess hazards
- Community engagement
- Interviews with stakeholders
- Property owner surveys
- Citizen science
- Workshops

Objective 2 Assess costs, risks, and actions
- Literature review
- Product: Hazard maps

Objective 3 Develop an integrated multiple risk model
- Product: Estimated costs and risk, list of actions

Objective 4 Develop an adaptive policy framework
- Product: Integrated risk model

Product: Participatory Scenarios & Adaptive Policy Framework

Year 1
- Objective 1 Assess hazards
- Community engagement

Year 1 and 2
- Objective 2 Assess costs, risks, and actions
- Literature review

All years
- Interviews with stakeholders
- Property owner surveys
- Citizen science
- Workshops

Year 3
- Objective 3 Develop an integrated multiple risk model
- Community engagement
Objectives: focus on wildfire

• **Objective 1**: Create decadal wildfire hazard maps (1980-2060)

• **Objective 2**: Assessing public and private costs, risks, and actions associated with wildfire and wildfire management

• **Objective 3**: Integrated multiple hazard assessment that illustrates overlap between risks from wildfire, permafrost thaw, and rain-in-winter

• **Objective 4**: Develop an adaptive policy framework to help residents, local government, and agencies to manage wildfire and wildfire risks
Alaska EPSCoR Research Focus

Boreal fire regimes

The **goal** of the Boreal Fires team is to increase community resilience to wildfire by improving evaluations of subseasonal-to-seasonal fire risk, models of fire spread, and *understanding of fire mitigation strategies and impacts of wildfire on ecosystem services.*
Integrative research

Wildfire

Society

Environment

Wildfire management

IFTDSS

FIREWISE USA™
Wildfire management: Fuels treatment database

• Goal: build a comprehensive fuels treatment geodatabase for Alaska that is available to wildfire suppression crews to aid their efforts

• Steps
  • Base layer is the division of forestry GIS layer
  • Combine with other sources
  • Maintain the relation to the original data
  • Use recent aerial imagery to visualize
Wildfire management: Fuels treatment database

Desired attributes:
Region
Type of treatment
Year of treatment
Visual footprint (yes/no)
Year of aerial imagery
Cost
Source of funding

Currently 1,237 fuel treatment polygons
Assessing wildfire hazards over time

- Main vegetation source:

  
  - https://doi.org/10.3334/ORNLDAAC/1691
Assessing wildfire hazards over time

https://daac.ornl.gov/ABOVE/guides/Annual_Landcover_ABoVE.html
How are things changing in Anchorage?

Photo Album
by Jennifer Schmidt
How are things changing in Fairbanks?
These are very small values (< 1%)!
Key points:
Size of the wedges = proportion on the land

So what is the largest type of “veg”?

Key points:
Inset = 1984
Outer = 2014

Key points:
Lines across the middle indicate a transition

Ex. Tall shrub to deciduous
These are larger values (> 1%)!
Fire is the key to vegetation changes
From this we can get transition rates to model forward

Percent Vegetation in Time Since Fire

Sparsely vegetated
Tall shrub
Key points:
Size of the wedges = proportion on the land

So what is the largest type of “veg”?

Key points:
Inset = 1984
Outer = 2014

Tall shrub increased
Key points:
Lines across the middle indicate a transition

How does the middle compare with Anchorage?

Key points:
Woodland transitions into many different types of veg

Key points:
Fire has changed increased deciduous
Targeting spruce for reduction in wildfire risk is certainly good, ABoVE is pretty good at picking up wildfire effects on vegetation, but not always.
Future

• Continue to build fuel treatment and work with the wildfire community to maximize its usefulness
• Alter the ABoVE data to break out the evergreen categories (i.e. black and white spruce, pine, etc.)
• Develop flammability crosswalks
• Use Flammmap and deterministic models to assess decadal wildfire hazards
• Gather information to model risk
Thank you and Questions

- Zeke Ziel
- NSF #1757348 Fire and Ice: Navigating Variability in Boreal Wildfire Regimes and Subarctic Coastal Ecosystems
- NSF #1927563 Collaborative Research: Arctic Urban Risks and Adaptations (AURA): a co-production framework for addressing multiple changing environmental hazards

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